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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/688,109

10/16/2003

Robert P. Meagley

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INTEL CORPORATION

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EXAMINER

WALKE, AMANDA C

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/688,109	Applicant(s) MEAGLEY ET AL.	
	Examiner Amanda C. Walke	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 1/12/09.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sewell et al (6,809,794) in view of Szmanda et al (6,787,286).

Sewell discloses a liquid immersion photolithography system includes an exposure system that exposes a substrate with electromagnetic radiation, and also includes a projection optical system that focuses the electromagnetic radiation on the substrate. The system include a light source and a plurality of lenses, the last one being in contact with the immersion liquid. The lens has an inherent refractive index. A liquid supply system provides a liquid between the projection optical system and the substrate. The projection optical system is positioned below the substrate. The system employs any known UV sensitive photoresist, but fails to specifically disclose one.

Szmanda et al disclose photoresists are provides that are suitable for short wavelength imaging, particularly sub-170 nm such as 157 nm. Resists of the invention comprise a fluorine-containing polymer, a photoactive component, and a solvent component. Preferred solvents for use on the resists of the invention can maintain the resist components in solution and include one or more preferably two or more (i.e. blends) of solvents. In particularly preferred solvent blends of the invention, each blend member evaporates at substantially equal rates, whereby the resist

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composition maintains a substantially constant concentration of each blend member. A solvent blend that comprises water, and one or more additional solvents such as one or more of a carbonyl and/or non-carbonyl solvent such as a heptanone, cyclohexanone, ethyl lactate, propylene glycol methyl ether acetate, and the like; preferably, water is present in minor amounts, e.g. no more than about 5 volume %, more preferably no more than about 4, 3, 2, 1, 0.5 or 0.25 volume percent of the total solvent component of a resist composition. A variety of photoactive components may be employed in resists of the invention. Photoacid generators (PAGs) are generally preferred. Particularly preferred PAGs for use in resists of the invention include onium salt compounds including iodonium and sulfonium compounds; and non-ionic PAGs such as imidosulfonate compounds, N-sulfonyloxyimide compounds; diazosulfonyl compounds and other sulfone PAGS including α,α -methylenedisulfones and disulfonehydrazines, nitrobenzyl compounds, halogenated particularly fluorinated non-ionic PAGS. Preferred PAGs do not have aromatic substitution. A variety of other PAGs may be used in resists of the invention, including non-ionic PAGs such as substituted disulfone compounds; sulfonate compounds including N-oxyimino sulfonate compounds, α -cyano N-oxyimino sulfonate compounds; disulfone hydrazine compounds; diazomethanedisulfone compounds; nitrobenzyl compounds; substituted acylsulfonioium compounds; and oxime sulfonate compounds including bis-N-oxyimidisulfonate compounds. Preferred basic additives are amine compounds, including primary, secondary, tertiary and quaternary amines. Amines that are not highly nucleophilic are generally preferred to avoid undesired reaction of the base additive with other resist composition components such as the PAG and/or solvent. More particularly, secondary and tertiary amines are generally preferred, particularly secondary and tertiary amines

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that have sterically large substituents, such as optionally substituted alkyl having at least 3 or 4 carbons e.g. optionally substituted C3-20 alkyl; optionally substituted alkyl having at least 3 or 4 carbons e.g. optionally substituted C3-20 alkyl including alicyclic groups such as optionally substituted cyclohexyl, adamantyl, isobornyl, etc.; optionally substituted alkenyl having at least 3 or 4 carbons e.g. optionally substituted C 3-20 alkenyl; optionally substituted alkynyl having at least 3 or 4 carbons e.g. C 3-20 alkynyl; optionally substituted carbocyclic ayl such as phenyl; optionally substituted heteroaryl or heteroalicyclic such as heteroaryl or heteroalicyclic groups having 1 to 3 separate or fused rings with 1 to 3 hetero atoms (particularly N, O or S) per ring. Specifically preferred basic additives for use in resist compositions of the invention include DBU (1,8-diazobicyclo[5.4.0]undec-7-ene); DBN (1,5-diazabicyclo[4.3.0]non-5-ene; N,N-bis-(2-hydroxyethyl)piperazine; N,N-bis-(2-hydroxyethyl)-2,5-diazobicyclo[2.2.1]heptane; N-triisopropanolamine; dibutyl amine preferably branched isomers thereof such as diisobutylamine and di-tert-butylamine; tributyl amine and again branched isomers thereof such as di-tert-butylamine and tri-tert-butylamine; and the like. Optionally substituted piperidine and other optionally piperazine compounds also will be suitable, particularly hydroxy-substituted or C 1-12 alcohol-substituted piperidines and piperazines, such as N-ethanol piperidine and N-diethanol piperazine. Other basic compounds also are suitable, particularly having one or more nitrogen ring members and 5 to about 8 total ring members. Other preferred base additives include hydroxy-alkyl secondary and tertiary amines, e.g. secondary and tertiary amines having at least one N-substituent of C 2-20 alkyl having one, two three or more hydroxy moieties, typically one or two hydroxy moieties; alicyclic amines where at least one secondary or tertiary nitrogen is at the junction or bridgehead of a bicyclic or multicyclic compound. Pyridyl compounds also will be

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suitable such as di-butyl pyridine and polymers thereof such as poly(vinylpyridine). In general, polymeric basic additives will be suitable, e.g. substituted amines having a molecular weight of up to about 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400 or 1500. The dissolution inhibitor also need not be polymeric (i.e. contain repeat units). For example, a variety of non-polymeric compositions are suitable dissolution inhibitors for resists of the invention, particularly where those materials are fluorinated. For instance, suitable are fluorinated compounds having one or more separate or fused rings, including fluorinated steroidal compounds, e.g. a fluorinated cholates and lithocholates such as cholic acid, deoxycholic acid, lithocholic acid, t-butyl deoxycholate, t-butyl lithocholate, and the like. Fluorinated steroidal compounds may be suitably preferred by fluorination of a known steroid, where a carbonyl group is modified to a difluoromethylene. Such non-polymeric compounds also may have one photoacid-labile groups, e.g. a photoacid-labile ester or acetal moiety. resists of the invention also may contain one or more plasticizer materials, which can inhibit or prevent undesired crazing or cracking of a deposited resist layer as well as enhance adhesion of the resist layer to an underlying material. Preferred plasticizers include e.g. materials having one or more hetero atoms (particularly S or O), and preferably materials having a molecular weight of about 20 to 1000, more typically about 20 to about 50, 60, 70, 80, 90, 100, 150, 200, 250, 300, 400 or 500, e.g. adipates, sebacates and phthalates such as bis(2-butoxyethyl)adipate; bis(2-butoxyethyl)sebacate; bis-(2-butoxyethyl)phthalate; 2-butoxyethyl oleate; diisodecyl adipate; diisodecyl glutarate; and poly(ethylene glycols) such as poly(ethyleneglycol)acrylate, poly(ethylene glycol)bis(2-ethylhexanoate), poly(ethylene glycol)dibenzoate, poly(ethylene

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glycol)dioleate, poly(ethylene glycol)monooleate, tri(ethylene glycol)bis(2-ethylhexanoate), and the like.

Given the teachings of the references, it would have been obvious to one of ordinary skill in the art to employ the system of Sewell choosing to employ the known and advantageous UV sensitive photoresist of Szmanda et al.

Response to Arguments

3. Applicant's arguments filed 1/12/09 have been fully considered but they are not persuasive. Applicant has amended the claims to reword the requirements, however, the same additives as claimed before are again incorporated, and applicant has again argued that the Sewell reference fails to teach the instantly claimed system and method comprising a last lens element, refractive index changing liquid, and a photoresist, however, the examiner respectfully disagrees. The arguments appear to be almost identical to those filed in the previous responses, therefore the examiner's position remains the same. It appears that the reference clearly teaches a last lens element as now claimed, index-matching liquid, and photoresist layer (see column 1, lines 42-59 and column 3, line 30- column 4, line 23). One of ordinary skill in the art would have immediately envisaged choosing a compatible liquid for the type of resist being employed as to be able to form a pattern. Similarly, the lens would inherently have a specific index of refraction as the lens would be chosen to perform the desired patterning function. Thus, the steps of determining the liquid and constituents would also be met by the references. For these reasons, the rejection is maintained.

1. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amanda C. Walke whose telephone number is 571-272-1337. The examiner can normally be reached on M-R 5:30-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Amanda C Walke
Primary Examiner
Art Unit 1795

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